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PROBLEMS.

39. Proposed by O. W. ANTHONY, M. Sc., Professor of Mathematics in New Windsor College, New Windsor, Maryland.

A man is at the center of a circular desert; he travels at a given rate but in a *perfectly* random manner. What is the probability that he will be off the desert in a given time?

40. Proposed by HENRY HEATON, M. Sc., Atlantic, Iowa.

If every point of an ellipse be joined with every other point, what is the average length of the chords thus drawn?

41. Proposed by F. P. MATZ, D. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

A line is drawn at random across the chord and *given* arc of a circular segment. Find the mean area of the *divisions*.

MISCELLANEOUS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

35. Proposed by WILLIAM SYMMONDS, A. M., Professor of Mathematics and Astronomy in Pacific College, Santa Rosa, California; P. O., Sebastopol, California.

To an observer whose latitude is 40 degrees north, what is the sidereal time when Fomalhout and Antares have the same altitude: taking the Right Ascension and Declination of the former to be 22 hours, 52 minutes, —30 degrees, 12 minutes; of the latter 16 hours, 23 minutes, —26 degrees, 12 minutes?

Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Applied Science, Texarkana College, Texarkana, Arkansas-Texas.

Let λ=latitude of observer, α, δ, α_1, δ_1 the Right Ascension and Declination of Fomalhout and Antares, respectively, β=altitude, h, h_1 the hour angles.

$\therefore \sin\beta=\sin\lambda\sin\delta+\cos\lambda\cos\delta\cos h=\sin\lambda\sin\delta_1+\cos\lambda\cos\delta_1\cos h_1$.

Also $h+\alpha=h_1+\alpha_1$.

But $\lambda=40^\circ$, $\alpha=343^\circ$, $\alpha_1=245^\circ\ 45'$, $\delta=-30^\circ\ 12'$, $\delta_1=-26^\circ\ 12'$.

$\therefore 66207\cos h-68734\cos h_1=3954$............(1).

$h_1-h=\alpha-\alpha_1=97^\circ\ 15'$, $\cos(h_1-h)=.12620$............(2).

Let $\cos h=x$, $\cos h_1=y$.

$\therefore$ from (2) $y=.1262x\pm\sqrt{.98407-.98407x^2}$. This in (1) gives $57532.7692x \mp 68184.81534\sqrt{1-x^2}=3954$.

$\therefore x^2-.05716x=.58216$, $\therefore x=.79211$ or $-.73495$.